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UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II

245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

December 19, 2013

Mr. Joseph W. Shea
Vice President, Nuclear Licensing
Tennessee Valley Authority
1101 Market Street, LP 3D-C
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT - NRC TRIENNIAL FIRE PROTECTION
INSPECTION REPORT 05000259/2013010, 05000260/2013010, AND
05000296/2013010

Dear Mr. Shea:

On November 8, 2013, the U.S. Nuclear Regulatory Commission (NRC) completed a Triennial Fire Protection Inspection at your Browns Ferry Nuclear Plant, Units 1, 2, and 3 in accordance with NRC Inspection Procedure 711105T. The enclosed report documents the inspection results, which were discussed on November 8, 2013, with Mr. S. Bono, General Manager of Site Operations, and other members of the Browns Ferry management staff.

The inspection examined activities conducted under your license as they related to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The team reviewed selected procedures and records, observed activities, and interviewed personnel.

NRC inspectors documented two findings of very low safety significance (Green) and one Severity Level IV violation in this report. These findings were determined to involve violations of NRC requirements. Two of the findings are documented in Enclosure 1 of this report and one of the findings is documented in Enclosure 2 of this inspection report. However because of the very low safety significance of these violations and because they were entered into your corrective action program, the NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a. of the NRC Enforcement Policy.

If you contest these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Browns Ferry Nuclear Plant.

~~Enclosure 2 transmitted herewith contains SUNSI. When separated from Enclosure 2, this transmittal document is decontrolled.~~

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J. Shea

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In addition, if you disagree with any cross-cutting aspect assignment in the report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region II, and the NRC Resident Inspector at the Browns Ferry Nuclear Plant.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its Enclosure 1, and your response (if any), will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's Agencywide Documents Access and Management system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room). However, because of the security-related information contained in Enclosure 2, and in accordance with 10 CFR 2.390, a copy of Enclosure 2, and your response (if any), will not be available for public inspection

Sincerely,

/RA/

Scott M. Shaeffer, Chief
Engineering Branch 2
Division of Reactor Safety

Docket Nos.: 50-259, 50-260, 50-296
License Nos.: DPR-33, DPR-52, DPR-68

Enclosures:

- 1: Inspection Report 05000259/2013010, 05000260/2013010
and 05000296/2013010 w/Attachment: Supplemental Information
2. Mitigation of Large Fires and Explosions (OUO)

cc: (See page 3)

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Letter to J. Shea from Scott M. Shaeffer dated December 19, 2013

SUBJECT: BROWNS FERRY NUCLEAR PLANT - NRC TRIENNIAL FIRE PROTECTION
INSPECTION REPORT 05000259/2013010, 05000260/2013010, AND
05000296/2013010

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**U. S. NUCLEAR REGULATORY COMMISSION
REGION II**

Docket Nos.: 50-259, 50-260, 50-296

License Nos.: DPR-33, DPR-52, DPR-68

Report Nos.: 05000259/2013010, 05000260/2013010 and 05000296/2013010

Licensee: Tennessee Valley Authority

Facility: Browns Ferry Nuclear Plant, Units 1, 2, and 3

Location: Athens, Alabama

Dates: October 28 – November 1, 2013 (Week 1)
November 4 – 8, 2013 (Week 2)

Inspectors: J. Dymek, Reactor Inspector
R. Fanner, Reactor Inspector
D. Jones, Senior Reactor Inspector
G. Ottenberg, Senior Reactor Inspector
G. Wiseman, Senior Reactor Inspector (Team Lead)

Accompanying Personnel: D. Terry-Ward, Construction Inspector (Training)

Approved by: Scott M. Shaeffer, Chief
Engineering Branch 2
Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000259/2013010, 05000260/2013010 and 05000296/2013010; 10/28 – 11/8/2013; Browns Ferry Nuclear Plant, Units 1, 2 and 3; Fire Protection (Triennial).

This report covers an announced two-week triennial fire protection inspection by a team of six regional inspectors. One Severity Level (SL) IV non-cited violation (NCV), and two Green NCVs were identified. The significance of inspection findings is indicated by their color (Green, White, Yellow, or Red) and determined using Inspection Manual Chapter (IMC) 0609, Significance Determination Process, dated June 2, 2011. Cross-cutting aspects are determined using IMC 0310, "Components Within the Cross-Cutting Areas," dated October 28, 2011. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy dated July 9, 2013. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process" Rev. 4, dated December 2006.

Cornerstone: Mitigating Systems

- Green. The inspectors identified a Green non-cited violation (NCV) of Browns Ferry Nuclear Plant (BFN) Unit Nos. 1, 2, and 3 Technical Specification 5.4.1.d for the failure to establish procedural guidance to implement compensatory measures for the high pressure fire protection (HPFP) system in support of the Fire Protection Report (FPR) and Safe Shutdown Instructions (SSI). The licensee entered this condition in their corrective action program (CAP) as problem evaluation report (PER) 812090 and issued an operations' Standing Order which supplemented existing fire watch patrol compensatory measures in Fire Area (FA) 25-1.

The licensee's failure to establish appropriate compensatory measures supporting the FPR and the SSI to ensure an adequate water supply remained available when the diesel driven fire pump was taken out of service was a performance deficiency. The performance deficiency was more-than-minor because it was associated with the protection against external events (fire) attribute of the Mitigating Systems Cornerstone and that it adversely affected the cornerstone objective of ensuring the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. The finding was screened in accordance with NRC IMC 0609, "Significance Determination Process", dated June 2, 2011, Attachment 4 "Initial Characterization of Findings". This screening determined that an IMC 0609, Appendix F "Fire Protection Significance Determination Process" was required because it affected fixed fire protection systems. Attachment 1, Step 1.4.2, "Fixed Fire Protection Systems" screened the finding to very low safety significance (Green) since the impact of a fire in FA 25-1 is limited to no more than one train/division important to safety and that the reactor would be able to reach and maintain safe shutdown condition.

The inspectors determined that no cross cutting aspect was applicable to this performance deficiency this finding because the operability requirements and compensatory actions in effect had been developed in the past (1988) and were not indicative of current licensee performance.. (Section R10.10)

- Severity Level IV. The inspectors identified a Severity Level IV, non-cited violation (NCV) of Browns Ferry Nuclear Plant (BFN) Renewed Facility Operating License Conditions 2.C.(13), (14), and (7) for Units 1, 2, and 3, respectively, and an associated finding of very low safety significance (Green) for the failure to perform an evaluation of the impact of a change to the Fire Protection Report on the fire protection license conditions, as directed by the licensee's procedure, FPDP-3, Management of the Fire Protection Report, Revision 3. The failure to adequately evaluate the impact of the change, which permitted the use of fire retardant treated wood materials as transient fire loads in safety related plant areas without further approval, resulted in the implementation of a change to the Fire Protection Program (FPP) that could have adversely affected the ability to achieve and maintain safe shutdown. The licensee also failed to submit the FPP change to the NRC for review and approval prior to implementation which impacted the ability of the NRC to perform its regulatory oversight function. The licensee entered the issue into their corrective action program (CAP) as problem evaluation report PER 812091 and issued an operations' Fire Protection Section Instruction Letter to require all wood products to be evaluated when left unattended in any plant fire area.

The inspectors determined that this finding was more than minor because if left uncorrected, could become a more significant safety concern. Specifically, if the licensee does not limit transient fire loads (including fire retardant treated wood) to below the capability of suppression systems or fire barrier ratings for a specific fire area as evaluated by the station's fire hazard analysis, a fire could spread to other fire areas and affect the ability to achieve and maintain safe shutdown in the event of a fire. The finding was evaluated using IMC 0609, Attachment 4, "Initial Characterization of Findings," issued June 19, 2012, for Mitigating Systems, and IMC 0609, Appendix F, "Fire Protection Significance Determination Process," issued September 20, 2013, and the inspectors determined the finding was of very low safety significance (Green) because the reactor would have been able to reach and maintain safe shutdown conditions under actual fire loading conditions. The SDP, however, does not specifically consider the regulatory process impact. Thus, although not related to a common regulatory concern, it is necessary to address the violation and finding using different processes to correctly reflect both the regulatory importance of the violation and the safety significance of the associated finding. The traditional enforcement violation was evaluated using the NRC Enforcement Policy, dated January 28, 2013, revised July 9, 2013, and the inspectors determined the violation was SL-IV per Section 6.1.d.2 of the Enforcement Policy, because the associated finding was evaluated by the SDP as having very low safety significance (i.e., Green). The inspectors determined failure to obtain prior NRC approval for fire protection program changes was similar to violations of 10 CFR 50.59 for enforcement purposes.

No cross-cutting aspect was assigned to this finding because the cause of the finding was not indicative of present licensee performance, since the change to the Fire Protection Report occurred in 2003. (Section 1R05.11)

- Green. The inspectors identified a Green non-cited violation (NCV) of Browns Ferry Nuclear Plant (BFN) Units 1, 2 and 3, Renewed Operating License Conditions 2.C(4)(b)(7), 2.C(6)(b)(7) and 2.C(10)(b)(7) respectively, for the licensee's failure to meet the requirements of the license condition for large fires or explosion mitigation strategies as discussed in Enclosure 2.

Licensee Identified Violations

No findings were identified.

REPORT DETAILS

1. REACTOR SAFETY (Inspection Report (IR) 05000259,260,296/2013010)

Cornerstones: Initiating Events, Mitigating Systems

1R05 Fire Protection (71111.05T)

Inspection Report 05000259,260,296/2013010 documents the results of a triennial fire protection inspection of the Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3. The inspection was conducted in accordance with the guidance provided in NRC Inspection Procedure (IP) 71111.05T, "Fire Protection (Triennial)," dated January 31, 2013. The objective of the inspection was to review a sample of three risk-significant fire areas (FAs) to evaluate implementation of the fire protection program (FPP) as described in the BFN Fire Protection Report (FPR), and to review site specific implementation of one mitigating strategy from Section B.5.b of NRC Order EA-02-026, "Order for Interim Safeguards and Security Compensatory Measures" (commonly referred to as B.5.b), as well as the storage, testing, and maintenance of B.5.b mitigating equipment.

The sample FAs were chosen based on a review of available risk information as analyzed by a senior reactor analyst from Region II, a review of previous inspection results, plant walkdowns of FAs, consideration of relational characteristics of combustible material to targets, and location of equipment needed to achieve and maintain post-fire safe shutdown (SSD) of the reactor. In selecting a B.5.b mitigating strategy sample, the inspectors reviewed licensee submittal letters, safety evaluation reports (SERs), licensee commitments, B.5.b implementing procedures, and previous NRC inspection reports. Section 71111.05-05 of the IP specifies a minimum sample size of three FAs and one B.5.b mitigating strategy for addressing large fires and explosions. This inspection fulfilled the requirements of the procedure by selecting a sample of four FAs and one B.5.b mitigating strategy. The FAs chosen were identified as follows:

1. FA 5, Unit 1 Reactor Building, Electrical Board Room and 250 V Battery Rooms SB-A, SB-B, Elevation 621'
2. FA 16, Unit 3 Control Building, Main Control Room (MCR) area [between column lines R14-R21], Elevation 621'
3. FA 22, Unit 3, 4KV Shutdown BD Rooms 3EA and 3EB, Elevation 565' and 583'
4. FA 25-1, Intake Pumping Station, Residual Heat Removal (RHR) Service Water Pumps and Cable Tunnel to fire door 440, Elevations 550' and 565'

For each of the selected FAs, the inspectors evaluated the licensee's FPP against applicable NRC requirements and licensee design basis documents. Applicable licensing and design basis documents reviewed by the inspectors are listed in the Attachment to this report.

.01 Protection of Safe Shutdown Capabilities

a. Inspection Scope

For the selected FAs, the inspectors performed physical walkdowns to observe: (1) the material condition of fire protection systems and equipment; (2) the storage of permanent and transient combustibles; (3) the proximity of fire hazards to cables relied upon for post-fire SSD; (4) the potential environmental impacts, if any, on credited operator manual actions (OMAs) to the areas adjacent to the FA; and (5) the licensee's implementation of procedures and processes for limiting fire hazards, housekeeping practices, and compensatory measures for inoperable or degraded fire protection systems and credited fire barriers.

Methodology

For the selected FAs, the inspectors evaluated the potential for the effect from the fire event on credited actions specified by licensee procedures. The inspectors reviewed the BFN Units 1, 2, & 3, Updated Final Safety Analysis Report (UFSAR), and conduit and cable tray routing information by FA, as well as, conducted field walkdowns of the cable routing to confirm that at least one train of redundant cables routed in the FA were adequately protected from fire damage or the licensee's analysis determined that the fire damage would not prohibit safe plant shutdown. The inspectors reviewed the BFN Safe Shutdown Analysis (SSA) for the selected FAs and compared it to selected Safe Shutdown Instructions (SSI) to verify that cables and safe shutdown components and equipment credited to provide reactivity control, reactor coolant makeup, reactor heat removal, process monitoring and support functions for post-fire SSD in the SSA and applicable SSIs were adequately protected from fire damage in accordance with the requirements of 10 CFR 50, Appendix R, Section III.G, "Fire Protection of Safe Shutdown Capability."

Operational Implementation

The inspectors reviewed the BFN FPR and the SSA to verify that the shutdown methodology properly identified the systems and components necessary to achieve and maintain post-fire SSD. The inspectors performed walkdowns of the procedural actions based upon the FAs selected to assess the implementation of the SSD strategy and human factors attributes associated with them. The inspectors reviewed licensee records, which specified the shift staffing from randomly selected dates, to verify the proper staffing levels existed to implement actions specified by licensee procedures. The inspectors reviewed licensee-training material to verify licensed and non-licensed operators were being trained based upon the current plant configuration.

b. Findings

No findings were identified.

.02 Passive Fire Protection

a. Inspection Scope

The inspectors walked down the selected FAs to evaluate the adequacy of the fire resistance of barrier enclosure walls, ceilings, floors, and structural steel support fire proofing protection. This evaluation also included fire barrier reinforced concrete, penetration seals, fire dampers, fire doors, and the Thermo-Lag electrical raceway fire barrier systems to verify that at least one train of SSD equipment would be maintained free of fire damage. Construction detail drawings were reviewed as necessary. Where applicable, the inspectors observed the installed barrier assemblies and compared the as-built configurations to the approved construction details; supporting fire endurance test data; licensing basis commitments; and standard industry practices. The fire protection features included in the review are listed in the Attachment to this report.

b. Findings

No findings were identified.

.03 Active Fire Protection

a. Inspection Scope

The inspectors performed in-plant observations of the material condition and operational lineup for the operation of the fire water pumps and High Pressure Fire Protection (HPFP) water supply distribution piping including, manual fire hose and standpipe systems for the selected FAs. Using operating and valve cycle/alignment procedures as well as engineering drawings, the inspectors examined the electric motor-driven and the diesel-driven fire pumps and accessible portions of the fire main piping system to evaluate operational status, consistency of as-built configurations with engineering drawings, and to verify correct system valve lineups (i.e. position of valves).

The inspectors compared the fire detection and fire suppression systems for the selected FAs to the applicable National Fire Protection Association (NFPA) Standard(s) by reviewing design documents and observing their as-installed configurations as part of performing the in-plant walk-downs. The inspectors reviewed selected fire protection vendor equipment specifications, drawings, and engineering calculations to determine whether the fire detection and suppression methods were appropriate for the types of fire hazards that existed in the selected FAs. During plant walk-downs, the inspectors observed the placement of the fire hose stations, fire extinguishers, fire hose nozzle types, and fire hose lengths, as designated in the firefighting pre-plan strategies, to verify they were not blocked and adequate reach and coverage was provided consistent with the firefighting strategies and FPP documents. The inspectors reviewed completed periodic surveillance testing and maintenance program procedures for the fire detection and suppression systems and compared them to the operability, testing, and compensatory measures requirements of procedure NPG-SPP-18.4.6, "Control of Fire Protection Impairments." This review was to assess whether the test program was sufficient to validate proper operation of the fire detection and suppression systems in accordance with their design requirements.

Aspects of fire brigade readiness were reviewed, including but not limited to, the fire brigade's personal protective equipment, self-contained breathing apparatuses, portable communications equipment, and other fire brigade equipment to determine accessibility, material condition and operational readiness of equipment. Brigade medical, training, and drill records were also reviewed. During plant walk-downs, the inspectors compared firefighting pre-plan strategies to existing plant layout and equipment configurations and to fire response procedures for the selected FAs. This was done to verify that firefighting pre-fire plan strategies and drawings were consistent with the fire protection features and potential fire conditions within the area and also to determine if appropriate information was provided to fire brigade members to facilitate suppression of an exposure fire that could impact the SSD strategy.

b. Findings

No findings were identified.

.04 Protection From Damage From Fire Suppression Activities

a. Inspection Scope

The inspectors evaluated whether water-based manual firefighting activities could adversely affect equipment credited for post-fire SSD, inhibit access to alternate shutdown equipment, or adversely affect local OMAS required for SSD in the selected FAs. The inspectors reviewed available documentation related to flooding analysis for the rupture and inadvertent operation of fire suppression systems, fire protection activities, and potential flooding through unsealed concrete floor cracks for this assessment.

b. Findings

No findings were identified.

.05 Alternative Shutdown Capability

a. Inspection Scope

The inspectors reviewed applicable sections of the FPR, fire hazards analysis (FHA), post-fire SSD procedures, system flow diagrams, electrical drawings, and other supporting documents for postulated fires in Fire Area 16 (Unit 3 MCR). The reviews focused on verifying that the required functions for post-fire SSD and the corresponding equipment necessary to perform those functions were included in the procedures. The review included assessing whether hot and cold shutdown from outside the MCR could be implemented, and that transfer of control from the MCR to the auxiliary control room could be accomplished. The inspectors also reviewed a sample of completed surveillance tests records to verify the transfer switches were functional and ensured transfer of plant controls from the MCR room to the auxiliary control room as required. By reviewing the records, the inspectors confirmed that testing was performed for the sample to demonstrate functionality of the transfer switches.

b. Findings

No findings were identified.

.06 Circuit Analyses

a. Inspection Scope

The inspectors reviewed the Updated Final Safety Analysis Report (UFSAR), Section 10.11, Fire Protection Systems, applicable sections of the Fire Protection Report (FPR), system flow diagrams, licensee training material, abnormal operating instructions, and SSIs to select a sample of components for review. The inspectors reviewed the post-fire safe shutdown analysis to verify that the licensee had identified both required and associated circuits that may impact post-fire safe shutdown for the selected FAs. On a sample basis, the inspectors verified that the cables of equipment specified in the SSA essential equipment list required for achieving and maintaining shutdown conditions, in the event of a fire in the selected FAs, had been properly identified. In addition, the inspectors reviewed cable routing information for a sample of credited components and verified that these cables had either been adequately protected from the potentially adverse effects of fire damage to show that fire induced faults would not prevent post-fire safe shutdown. In instances where questions arose inspectors had licensee personnel to provide further insights on differences between. The inspectors reviewed samples of the licensee's electrical coordination study to determine if power supplies were susceptible to fire damage, which would potentially affect the credited components for the FAs chosen for review. The specific components reviewed are listed in the Attachment to this report.

b. Findings

No findings were identified.

.07 Communications

a. Inspection Scope

The inspectors reviewed the communication capabilities required to support plant personnel in the performance of OMAs to achieve and maintain post-fire SSD as required by Appendix R. The inspectors reviewed applicable sections of the BFN FPR and UFSAR which specified the credited communications systems. The inspectors performed plant walkdowns with the licensee's operations staff to assess the credited method of communications used to complete safe shutdown actions as specified in post-fire SSD procedures for the selected FAs. The inspectors assessed the operator's ability to communicate based upon completed actions by requesting licensee operations staff to perform radio checks during the walkdowns from applicable control locations.

b. Findings

No findings were identified.

.08 Emergency Lighting

a. Inspection Scope

The inspectors reviewed maintenance and design aspects of the fixed 8-hour battery pack emergency lighting units (ELUs) required by 10 CFR 50 Appendix R, Section III.J and the BFN approved FPP. The inspectors performed plant walkdowns based upon the selected FAs to observe the placement and coverage area of the ELUs required for providing operators illumination to the areas containing equipment needed for emergency shutdown during a fire as well as the access and egress routes which must be taken to reach the necessary equipment. In some instances during walkdowns operations personnel performed an onsite test of the ELUs to verify operation. The inspectors reviewed completed maintenance records to assess the maintenance practices and adverse failure trends. The inspectors reviewed manufacturer's information on 8-hour battery pack ELUs to verify that the battery power supplies were rated with at least an 8-hour capacity.

b. Findings

No findings were identified.

.09 Cold Shutdown Repairs

a. Inspection Scope

The inspectors determined that the licensee does not credit cold shutdown repairs for postulated fire events.

b. Findings

No findings were identified.

.10 Compensatory Measures

a. Inspection Scope

Compensatory Measures for Degraded Fire Protection Components

The inspectors reviewed the administrative controls for out-of-service, degraded and/or inoperable fire protection features (e.g. HPFP system , detection systems, and passive fire barriers) to verify that short-term compensatory measures were adequate for the degraded function or feature until appropriate corrective actions could be taken. The inspectors also reviewed the redundancy of fire protection water sources and fire pumps to confirm they were installed in accordance with the National Fire Protection Association (NFPA) codes-of-record to satisfy the applicable separation, design requirements, and licensing basis requirements of the BFN FPR. This review included an examination of portions of the licensee's SSA, SSIs, and select electrical circuit routing drawings outlining the fire water pumps' power and pressure start capability to verify that the fire water system would be available to support fire brigade response activities during power block fire events.

Operator Manual Actions (OMA) as Compensatory Measures for Safe Shutdown

The inspectors reviewed five operator work-arounds that documented where local OMAs were credited in lieu of cable protection of SSD equipment for the selected fire areas. The inspectors reviewed these applicable OMAs to verify that the OMAs were feasible utilizing the guidance of NRC IP 71111.05T, paragraph 02.02.j.2. The operator work-arounds are listed in the Attachment to this report.

Interim Compensatory Measures for Risk Reduction During Transition to NFPA 805

The inspectors reviewed the licensee's implementation of interim compensatory measures described in the attachment to the licensee's letter dated May 16, 2013. These interim compensatory measures were regulatory commitments to reduce the risk of identified higher risk fire areas until implementation of the modifications listed in Attachment S, Table S-2, of the licensee's license amendment request to adopt NFPA 805, dated March 27, 2013, was completed. The inspectors verified that the licensee entered these commitments into their commitment management program for implementation. To verify the implementation of these actions, the inspectors:

- Reviewed the licensee's administrative procedural guidance on limiting transient combustibles in designated high-risk and transient combustible free areas to verify the licensee had adequate guidance to issue and track permits in high risk areas and to disallow transient combustibles in designated transient combustible free areas
- Reviewed completed transient combustible permits to verify quantities of combustibles were being tracked
- Reviewed records of completed fire watches performed in fire area 16 to verify the watches were completed as committed
- Reviewed completed fire door test records and associated required test performance frequency in the licensee's work control process to verify the automatic fire doors were being tested as committed
- Observed hot work pre-job briefing to verify the additional controls beyond that required in NPG-SPP-18.4.8, Control of Ignition Sources, were being implemented
- Interviewed operations personnel familiar with, and performed a walkdown of, the temporary diesel generators credited as an additional power source for a shutdown board to verify the strategy for aligning the temporary diesels was achievable under the conditions the diesels would be required to operate
- Reviewed administrative procedures for protecting equipment when hot work was performed in certain fire areas
- Reviewed procedures and maintenance rule unavailability data to verify the unavailability of the emergency equipment cooling water (EECW) system headers was being controlled
- Reviewed requirements to have the Unit 3 main control room heating, ventilation, and air conditioning available when the EECW south header or transformer TS3A was unavailable

a. Findings

Introduction: An NRC identified Green NCV of Unit Nos. 1, 2, and 3 Technical Specification 5.4.1.d was identified for the licensee's failure to establish procedural guidance to implement

compensatory measures for the High Pressure Fire Protection (HPFP) system in support of the FPR and SSIs.

Description: The BFN FPR stated that the HPFP system water supply consisted of three 100% electric motor driven fire pumps located inside of the Intake Pumping Station and a single 100% diesel driven engine fire pump located in a separate structure on the cold water channel. The FPR defined the operability requirement of the HPFP as having, two high pressure fire pumps, one electric and one diesel. In a letter dated April 4, 1988, the licensee provided the BFN FPR to the NRC, which included a NFPA code deviation summary. Section 4.0 of the summary presented a comparison to NFPA 20, "Centrifugal Fire Pumps." It states, in part,

the most significant deviations noted related to the lack of independence between the three electric fire pumps. In essence, the three pumps are considered as a single pump installation. The power supply for the three electric fire pumps is routed through a common tray in the cable tunnel. With this configuration a single fire could cause loss of power to all three fire pumps.

In follow-up correspondence dated August 3, 1988 the licensee provided a justification for the code deviation which state in part,

The diesel driven fire pump would remain free of fire damage during a cable tunnel fire. This pump is capable of supplying the largest demand suppression system in a safety related area. Therefore, in the event all three electric fire pumps were lost, adequate pumping capability would remain available and that backup provisions are available to ensure that there is an adequate fire protection water supply for the largest demand suppression system in a safety related area..

The inspectors noted that when the credited diesel fire pump was taken out of service for scheduled maintenance/surveillance, a fire in the cable tunnel (FA 25-1) could adversely affect the HPFP electric motor driven fire pumps power supplies and render them incapable of supplying the largest demand suppression system for a safety related area. The inspectors also noted that one of the immediate Unit 1 Operator control room actions called for in Section 4.0, Step 1.4.1 of procedure 0-SSI-25-1 was to start the diesel fire pump (0-HS-26-106A1) for a fire in FA 25-1. Such an action could not be taken if the diesel fire pump were taken out of service during the repair of the diesel driven pump or during a major 18-month required maintenance inspection. The inspectors determined that that the established fire protection compensatory measures were not appropriate to protect equipment important for safe shutdown in FA 25-1 based upon the FPR and Appendix R SSD SSI. The licensee entered this condition in their corrective action program as PER 812090 and issued an operations' Standing Order OS-0192, which supplemented existing fire watch patrol compensatory measures in Fire Area FA 25-1.

Analysis: The licensee's failure to establish appropriate compensatory measures supporting the FPR and the SSIs to ensure an adequate water supply remains available when the diesel driven fire pump was taken out of service was a performance deficiency. The performance deficiency was more-than-minor because it was associated with the protection against external events (fire) attribute of the Mitigating Systems Cornerstone and that it adversely affected the cornerstone objective of ensuring the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically the established compensatory measures did not consider that FA 25-1 would have less than credited suppression capability when the diesel fire pump was taken out of service. The finding was screened in accordance with NRC IMC 0609, "Significance Determination Process", dated

June 2, 2011, Attachment 4 “Initial Characterization of Findings”. This screening determined that an IMC 0609, Appendix F “Fire Protection Significance Determination Process” was required because it affected fixed fire protection systems. Attachment 1, Step 1.4.2, “Fixed Fire Protection Systems” screened the finding to very low safety significance (Green) since the impact of a fire in FA 25-1 is limited to no more than one train/division important to safety and that the reactor would be able to reach and maintain safe shutdown condition. The inspectors determined that no cross cutting aspect was applicable to this performance deficiency this finding because the operability requirements and compensatory actions in effect had been developed in the past (1988) and were not indicative of current licensee performance.

Enforcement: BFN, Unit Nos. 1, 2, and 3 Technical Specifications 5.4.1 require that written procedures shall be established, implemented and maintained for activities, including 5.4.1.d “Fire Protection Program implementation”. BFN FPR Volume 1, Fire Protection Plan, Section 7.4 “Control of Fire Protection Impairments” state, in part, that fire protection equipment and fire barriers are to remain fully operational at all times , to the maximum extent possible. A system has been developed and implemented to monitor fire protection impairments in order to assure appropriate compensatory measures are instituted.

Contrary to the above, prior to November 7, 2013, the licensee failed to establish adequate compensatory actions to assure that HPFP system water supply equipment remained fully operational at all times. Specifically the established compensatory measures did not consider that FA 25-1 would have less than credited suppression capability when the diesel fire pump was taken out of service. Because of the very low safety significance and because the licensee included this condition in their corrective action program as PER 812090, this violation is being treated as an NCV, consistent with section 2.3.2 of the NRC Enforcement Policy. (NCV 05000259/2013010-01; 05000260/2013010-01; 5000296/2013010-01, Inadequate Compensatory Actions to Minimize the Effects of Impaired Fire Protection Equipment on Fire Safe Shutdown)

.11 Review and Documentation of Fire Protection Program Changes

a. Inspection Scope

The inspectors reviewed a change associated with the fire protection program combustible material administrative controls to verify that the change was in accordance with the fire protection license conditions and that the change had no adverse effect on the ability to achieve and maintain safe shutdown. The historical changes to the combustible material control implementing procedures were reviewed to determine the nature and timeframe of relevant updates to the procedures.

b. Findings

Introduction. The inspectors identified a Severity Level IV (SL IV) non-cited violation (NCV) and associated Green finding of BFN Renewed Facility Operating License Conditions 2.C. (13), (14), and (7) for Units 1, 2, and 3, respectively, for the licensee’s failure to perform an evaluation of the impact of a change to the FPR on the fire protection license conditions, as directed by the licensee’s procedure, FPDP-3, Management of the Fire Protection Report, revision 3. The failure to adequately evaluate the impact of the change resulted in the implementation of a change to the Fire Protection Program that could have adversely affected the ability to achieve

and maintain safe shutdown, and was required to be submitted to the NRC for review and approval prior to implementation.

Description. BFN Units 1, 2, and 3 Renewed Facility Operating License Conditions 2.C.(13), (14), and (7), respectively, require, in part, that the licensee implement and maintain in effect all provisions of the approved Fire Protection Program as described in the Final Safety Analysis Report for BFN as approved in the safety evaluation dated March 31, 1993. Furthermore, the license conditions allowed the licensee to make changes to the approved fire protection program without prior NRC approval only if the change did not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

The station's UFSAR, Chapter 10.11, Fire Protection Systems, stated, "[t]he Fire Protection Report, Volume 1 is the licensing basis for BFN's Fire Protection Program." The safety evaluation, dated March 31, 1993, Section 2.4, "Administrative Controls", concluded that BFN's administrative controls for combustibles were acceptable based on the licensee's implementation of Standard 12.15, "Fire Protection". Section 3.1.1., "Control of Combustible Materials," of Standard 12.15, stated, in part, "Methods are implemented to... limit transient fire loads such as wood and plastic products." The licensee manages changes to the fire protection program in accordance with the process contained in procedure FPDP-3. Section 3.3., "FP License Condition Impact Evaluation Process," of FPDP-3, required an evaluation of the impact of the change on the fire protection license conditions.

In 2003, the licensee performed an evaluation (evaluation LCIE RIMS R06 031205 907) of a change to the BFN FPR using procedure FPDP-3. The change added a statement, "[h]owever, use of fire retardant treated wood is allowed without further approval." The inspectors reviewed the evaluation and determined that the licensee inappropriately concluded that the change was administrative and did not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire. The inspectors determined the licensee (1) did not maintain in effect provisions of their implementing procedure for combustible material controls to limit transient fire loads as approved in the March 31, 1993, safety evaluation, and (2) made a change to the fire protection report that could have adversely affected the ability to achieve and maintain safe shutdown which required prior approval by the NRC. Specifically the change adversely affected the control of transient combustibles as implemented in Standard 12.15 and approved by the 1993 safety evaluation, in that the licensee no longer controlled or limited fire retardant wood as transient combustible fire loads. As immediate corrective actions, licensee entered the issue into their corrective action program as PER 812091 and issued an operations' Fire Protection Section Instruction Letter (FPSIL -15) to require all wood products to be evaluated when left unattended in any plant fire area.

Analysis. The inspectors determined that the licensee's failure to perform an evaluation of the impact of a change to the Fire Protection Report on the fire protection license conditions, as directed by the licensee's procedure FPDP-3 was a performance deficiency. The performance deficiency was more than minor because if left uncorrected, could become a more significant safety concern. Specifically, if the licensee does not limit transient fire loads to below the capability of suppression systems or fire barrier ratings for a specific fire area as evaluated by the station's fire hazard analysis, a fire could spread to other fire areas and affect the ability to achieve and maintain safe shutdown in the event of a fire. Additionally, the licensee's failure to obtain prior NRC approval for the fire protection program change was determined to impact the regulatory process because the change required NRC review and approval prior to implementation. Specifically, BFN Units 1, 2, and 3 Renewed Facility Operating License

Conditions 2.C.(13), (14), and (7), respectively, required, in part, that the licensee may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

This violation is associated with a finding that has been evaluated by the SDP and communicated with an SDP color reflective of the safety impact of the deficient licensee performance. The SDP, however, does not specifically consider the regulatory process impact. Thus, although not related to a common regulatory concern, it is necessary to address the violation and finding using different processes to correctly reflect both the regulatory importance of the violation and the safety significance of the associated finding.

The finding was evaluated using IMC 0609, Attachment 4, "Initial Characterization of Findings," issued June 19, 2012, for Mitigating Systems, and IMC 0609, Appendix F, "Fire Protection Significance Determination Process," issued September 20, 2013, and the inspectors determined the finding was of very low safety significance (Green) because the reactor would have been able to reach and maintain safe shutdown conditions under actual fire loading conditions. The traditional enforcement violation was evaluated using the NRC Enforcement Policy, dated January 28, 2013, revised July 9, 2013, and the inspectors determined the violation was SL-IV per Section 6.1.d.2 of the Enforcement Policy, because the associated finding was evaluated by the SDP as having very low safety significance (i.e., Green). The inspectors determined failure to obtain prior NRC approval for fire protection program changes was similar to violations of 10 CFR 50.59 for enforcement purposes.

No cross-cutting aspect was assigned to this finding because the cause of the finding was not indicative of present licensee performance, since the change to the Fire Protection Report occurred in 2003.

Enforcement. BFN Units 1, 2, and 3 Renewed Facility Operating License Conditions 2.C.(13), (14), and (7), respectively, states, in part, that the licensee shall implement and maintain in effect all provisions of the approved Fire Protection Program as described in the Final Safety Analysis Report for BFN as approved in the safety evaluation dated March 31, 1993. License Conditions 2.C.(13), (14), and (7) further state, in part, that the licensee may make changes to the approved fire protection program without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

Contrary to the above, since 2003, when the licensee updated the fire protection report, the licensee failed to maintain in effect all provisions of the approved fire protection program as approved in the safety evaluation dated March 31, 1993, and additionally made a change to the approved fire protection program that could have affected the ability to achieve and maintain safe shutdown in the event of a fire without prior Commission approval. Specifically, the licensee added a statement "however, use of fire retardant treated wood is allowed without further approval," to the Fire Protection Report which could have allowed an uncontrolled amount of combustibles in fire areas in the plant. This was contrary to the fire protection program as approved by the Commission in the safety evaluation dated March 31, 1993, and could have affected safe shutdown if transient fire loads were not limited to below the capability of suppression systems or fire barrier ratings for a specific fire area as evaluated by the station's FHA.

This violation is being treated as an NCV consistent with section 2.3.2 of the Enforcement Policy. The violation was entered into the licensee's corrective action program as PER 812091. Also, the licensee issued an operations' Fire Protection Section Instruction Letter (FPSIL -15) to require all wood products to be evaluated when left unattended in any plant fire area. (NCV 05000259/2013010-02; 05000260/2013010-02; 5000296/2013010-02, Inadequate Evaluation of Combustible Material Control Fire Protection Program Change)

.12 Control of Combustibles and Ignition Sources

a. Inspection Scope

The inspectors conducted tours of numerous plant areas that were important to reactor safety, including the selected FAs, to verify the licensee's implementation of FPP requirements as described in the BFN FPP and administrative procedure NPG-SPP-18.4.7, "Control of Transient Combustibles." For the selected FAs, the inspectors evaluated generic fire protection training; fire event history; the potential for fires or explosions; the combustible fire load characteristics; and the potential exposure fire severity to determine if adequate controls were in place to maintain general housekeeping consistent with the Fire Protection Report, administrative procedures, and other FPP procedures. There were no hot work activities ongoing within the selected fire areas during the inspection and observation of this activity could not be performed.

b. Findings

No findings were identified.

.13 Mitigation of Large Fires and Explosions

a. Inspection Scope

The inspectors reviewed, on a sample basis, the licensee's external makeup to the spent fuel pool strategy. The inspectors verified that the guidelines were feasible, personnel were trained to implement the strategy, and equipment was properly staged and maintained to ensure the licensee staff provided an adequate response to large fires and explosions specified by the guidelines. The inspectors requested and reviewed the inventory of equipment; maintenance records of required equipment; job performance measures and requests to view the physical location of the equipment to ensure all attributes would be available based upon the chosen strategy. The inspectors performed walk downs of the storage and staging areas for the B.5.b equipment to verify that equipment identified for use in the current procedures were available, calibrated, maintained, and tested in accordance with the licensee's B.5.b program procedures.

Through discussions with licensee staff, review of applicable documentation, and plant walkdowns, the inspectors verified the engineering assumptions credited with responding to this type of an event were reasonable. The inspectors reviewed engineering calculations to assess the water makeup capacity required by the strategy and concluded there was reasonable assurance that specified requirements could be met using the specified equipment and credited water sources listed in the implementation guidelines. The inspectors reviewed completed training records of the licensee's staff to verify that personnel were trained and familiar with the applicable strategy objectives and implementing guidelines. In instances where records for potential responders were not available, the inspectors performed interviews of licensee personnel.

b. Findings

One finding was identified and is documented in Enclosure 2 of this report.

4. OTHER ACTIVITIES

4OA2 Problem Identification and Resolution

a. Inspection Scope

The inspectors reviewed a sample of licensee independent audits, self- assessments, and system/program health report for thoroughness, completeness and conformance to FPP requirements. The inspectors also reviewed corrective action program documents, including completed corrective actions documented in selected problem evaluation reports and operating experience program documents, to ascertain whether industry identified fire protection issues affecting BFN were appropriately entered into the corrective action program for resolution. The documents reviewed are listed in the Attachment.

b. Findings

No findings were identified

4OA6 Meetings, Including Exit

On November 8, 2013, the lead inspector presented the preliminary inspection results to Mr. S. Bono, General Manager of Site Operations, and other members of the licensee's staff, who acknowledged the findings. Proprietary information is not included in this inspection report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

S. Austin, Site Licensing Engineer
J. Barker, Operation Support Superintendent
S. Bono, General Manager, Site Operations
J. Boyer, Assistant Engineering Director
S. Kammer, Appendix R Programs Engineer
J. Paul, Nuclear Site Licensing Manager
R. Sampson – Electrical & I&C Lead
B. Simril, TVA Corporate Fire Protection Program Manager
H. Smith, Operations Fire Marshal
T. Stafford, NFPA 805 Engineering Supervisor
J. Steele, Fire Operations
P. Summers, Director of Safety and Licensing
P. Wilson, Site Licensing Oversight Manager

NRC Personnel

D. Dumbacher, Senior Resident Inspector
L. Pressley, Resident Inspector
S. Shaeffer, Chief, Engineering Branch 2, Division of Reactor Safety, Region II

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

None

Opened and Closed

05000259, 260, 296/2013010-01	NCV	Inadequate Compensatory Actions to Minimize the Effects of Impaired Fire Protection Equipment on Fire Safe Shutdown (Section 1R05.10)
05000259, 260, 296/2013010-02	NCV	Inadequate Evaluation of Combustible Material Control Fire Protection Program Change (Section 1R05.11)
05000259, 260, 296/2013010-03	NCV	Failure to Meet the Requirements of Large Fire and Explosion Mitigation Strategies (Enclosure 2)

Closed

None

Discussed

None

LIST OF FIRE BARRIER FEATURES INSPECTED

(Refer to Report Section 1RO5.02)

Fire Barriers Floors/Walls/Ceiling Identification

Reinforced Concrete Walls, Floors & Ceiling
Reinforced Concrete Walls, Floors & Ceiling
Reinforced Concrete Walls, Floors & Ceiling
Reinforced Concrete Walls, Floors & Ceiling

S16215702
S35933142
P05654032

Description

U1 Reactor Building, FA 5
U3 Control Building, FA16
Diesel Generator Building, FA 22
Intake Structure, FA 25-1

Conduit Penetration, FA 5
Conduit Penetration, FA 5
Penetration (Spare), FA 25-1

Fire Door Identification

1-260-0631
1-260-0632
1-260-0637
810
824

Description

FA 5
FA 5
FA 5
4KV Shutdown Board 3EB, FA 22
4KV Shutdown Board 3EA, FA 22

Fire Damper Identification

1-XFD-031-2633
1-XFD-031-2634
3-31-1306
3-31-1307
3-31-1308
3-31-1314

Description

FA 5
FA 5
4KV Shutdown Board 3EB, FA-22
4KV Shutdown Board 3EB, FA-22
4KV Shutdown Board 3EB, FA-22
4KV Shutdown Board 3EB, FA-22

LIST OF COMPONENTS REVIEWED

(Refer to Report Sections 1R05.01 / 1R05.03 / 1R05.05 / 1R05.06)

1-PMP-074-0005, RHR Pump 1A
2-PMP-074-0028, RHR Pump 2B
2-PMP-074-0016, RHR Pump 2C
3-PMP-074-0005, RHR Pump 3A
0-PMP-023-0001, RHRSW Pump A1
0-PMP-023-0005, RHRSW Pump A2
0-PMP-023-0019, RHRSW Pump B2
0-PMP-023-0012, RHRSW Pump C2
0-PMP-023-0027, RHRSW Pump D2
0-PMP-026-0003, Fire Pump C
1-FCV-73-44, HPCI discharge flow
2-FCV-73-44, HPCI discharge flow
3-FCV-73-44, HPCI discharge flow
0-FCV-25-70, Raw Service Water Head Tank Isolation Valve
0-FCV-25-32, RSW TK Isolation Valve

Instruments

1-LI-2-169A, Condensate Storage Tank Level, Unit 1
2-LI-2-161A, Condensate Storage Tank Level, Unit 2
3-LI-2-161A, Condensate Storage Tank Level, Unit 3
2-LI-64-54B, Torus Suppression Pool Level
3-LI-3-46A, RPV Level

LIST OF DOCUMENTS REVIEWED

Procedures

- 0-AOI-26-1, Fire Response, Rev. 16
- 0-AOI-57-1A, Loss of Offsite Power (161 and 500KV)/Station Blackout, Rev. 90
- 0-GOI-200-1, Freeze Protection Inspection, Rev.76
- 0-GOI-300-1, Operator Round Logs, Rev. 207
- 0-GOI-300-2, Electrical, Rev. 122
- 0-OI-23, Residual Heat Removal Service Water System, Rev.94
- 0-OI-67, Emergency Equipment Cooling Water System, Rev. 98
- 0-OI-82, Standby Diesel Generator System, Rev. 147
- 0-SI-4.11.A.1(1), Local Fire Control Panel 0-LPNL-925-0555 Control Bay Elev. 593.0 Detection Operability Test, Rev. 17
- 0-SI-4.11.A.1(3),), Local Fire Control Panel 0-LPNL-925-0556 Control Bay Elev. 617.0 Detection Operability Test, Rev. 7
- 0-SI-4.11.A.1(4), Local Fire Control Panel 0-LPNL-925-0538 Intake Pumping Station and Cable Tunnel Detection Operability Test, Rev. 15
- 0-SI-4.11.A.2(1), Local Fire Control Panel 0-LPNL-925-0056 Miscellaneous Inputs Supervised Circuits Operability Test, Rev. 19
- 0-SI-4.11.B.1.a, Electric Fire Pump Operability Test, Rev. 21
- 0-SI-4.11.B.1.b, High Pressure Fire Protection Valve Position Verification (Inside Loop), Rev. 51
- 0-SI-4.11.B.2.a, Diesel Driven Fire Pump Operability Test, Rev. 52
- 0-SI-4.11.B.2.b, Diesel Driven Fire Pump (Gate Structure No. 2) Fuel Oil Quality Check, Rev. 29
- 0-SI-4.11.B.3.a, Weekly Check for Diesel Fire Pump Batteries 1 & 2, Rev. 23
- 0-SI-4.11.G.1.a.(1), Visual Inspection of Fire Wraps, Rev. 11
- 0-SI-4.11.G.1.a.(1), Visual Inspection of Fire Wraps, Rev. 13
- 0-SI-4.11.G.1.a, Visual Inspection of Fire Rated Barriers (Unit 1 Steam Tunnel Floors, Walls & Ceilings), Rev. 0
- 0-SI-4.11.G.1.a, Visual Inspection of Fire Rated Barriers (Floors, Walls & Ceilings), Rev. 20
- 0-SI-4.11.G.1.a, Visual Inspection of Fire Rated Barriers (Floors, Walls & Ceilings), Rev. 22
- 0-SI-4.11.G.1.a, Visual Inspection of Fire Rated Barriers (Floors, Walls & Ceilings), Rev. 23
- 0-SI-4.11.G.1.b.(2), Visual Inspection of Second Period Appendix R Fire Dampers, Rev. 17
- 0-SI-4.11.G.1.b.(6), Visual Inspection of Third Period Appendix R Fire Dampers, Rev. 9
- 0-SI-4.11.G.1.c.(2), Visual Inspection of Cable Tray Penetrations in Fire Rated Barriers, Rev. 17
- 0-SI-4.11.G.2, Semiannual Fire Door Inspection, Rev. 27
- 2-SI-4.11.G.1.a, Visual Inspection of Fire Rated Barriers (Unit 2 Steam Tunnel Floors, Walls & Ceilings), Rev. 2
- 2-SI-4.11.G.1.a, Visual Inspection of Fire Rated Barriers (Unit 2 Steam Tunnel Floors, Walls & Ceilings), Rev. 3
- 3-SI-4.11.A.1(1), Local Fire Control Panel 3-LPNL-025-0543 U3 DG Building Detection Operability Test, Rev. 14
- 3-SI-4.11.G.1.a, Visual Inspection of Fire Rated Barriers (Unit 3 Steam Tunnel Floors, Walls & Ceilings), Rev. 2
- 0-SR-3.3.3.2.1, Backup Control Panel Testing, Rev. 8
- 0-SR-3.8.1.1 (TDG Implementation) Temporary Diesel Generators Implementing Surveillance, Rev. 19
- 0-SSI-001, Safe Shutdown Instructions, Rev. 17
- 0-SSI-005, Unit 1, 4KV Electric Board Room 1A, Rev. 29
- 0-SSI-16, Control Building Fire, EL 593 through EL 617, Rev. 30

0-SSI-22, Unit 3, 4160V Shutdown Board 3EA & 3EB Room
0-SSI-25-1, Intake Pumping Station El. 550, Cable Tunnel to Fire Door 440, RHRSW Pump Room B, RHRSW Pump Room D, Rev. 40
0-TI-576, Temporary Diesel Generator (TDG), Rev. 11
1-AOI-78-1, Fuel Pool Cleanup System Failure, Rev. 20
BFN-ODM-4.18, Protected Equipment, Revs. 12 and 14
EPIP-17, Fire Emergency Procedure, Rev. 31
EDMG-01, Initial Response (Re-Establish Command and Control), Rev. 1
EDMG-02, Long Term Emergency Response Organization (Command Post), Rev. 0
EDMG-05, Fire System Management Tables/Drawings, Rev. 1
EDMG-22 Extensive Damage Mitigating Guideline, Rev. 1
EDMG-24, Reactor Pressure Vessel Makeup, Rev. 10
FP-0-000-INS005, Quarterly Inspection of Emergency Equipment, Rev. 33
FP-0-026-INS010, Fire Protection Outside to Inside Loop Cross Connection, Rev. 13
FP-0-000-INS019, Fire Protection Weekly Inspection, Rev. 17
FPDP-1, Conduct of Fire Protection, Rev. 0003
FPDP-3, Management of the Fire Protection Report, Revs. 3 and 6
FPDP-4, Fire Emergency Response, Rev. 1
FPDP-5, Development and Evaluation of Fire Drills, Rev. 1
FPSIL-015, Transient Combustible Loading Control, Rev. 1
NPG-SPP-01.2, Administration of Site Technical Procedures, Rev. 9
NPG-SPP-03.3, NRC Commitment Management, Rev. 2
NPG-SPP-06.9.1, Conduct of Testing, Rev. 3
NPG-SPP-07.3.4, Protected Equipment, Rev. 1
NPG-SPP-09.17, Temporary Equipment Control, Rev. 4
NPG-SPP-18.4.5, Fire Protection Quality Assurance (Q07), Rev. 0
NPG-SPP-18.4.5, Fire Protection Quality Assurance, Rev. 6
NPG-SPP-18.4.6, Control of Fire Protection Impairments, Rev. 2
NPG-SPP-18.4.7, Control of Transient Combustibles, Rev. 3
NPG-SPP-18.4.8, Control of Ignition Sources (Hot Work), Rev. 1
NPG-SPP-22.301, Service Request Initiation, Rev. 0
SPP-10.10, Control of Transient Combustibles, Rev. 2
STD-12.15, Fire Protection, Rev. 0
TVA-SPP-11.5.2, Tobacco Cessation and Smoke Free Zones, Rev. 1
1/2-AOI-57-1D, 480V Load Shed, Revision 0001

Calculations, Evaluations, & Specifications

BFN-50-728, Physical Independence of Electrical Systems, Rev. 21
BFN-50-747, Fire Protection of Safe Shutdown, Rev. 06
BFN-50-799, Fire and Pressure Seals, Rev. 6
BFN-50-7026, High Pressure Fire Protection, Rev. 7
BFN-50-7039, CO2 Storage, Fire Protection and Purging System, Rev. 4
BFN-50-7038, Fire Alarm and Detection System, Rev. 6
EDN0244890050, Appendix R Analysis For Intraplant Communication System, Rev. 011

ED-Q0999-2003-0037, Appendix A – TVA BFN- 1, 2, and 3 Overview of Mechanical and Electrical Equipment Required by Units 1, 2, and 3 for Safe Shutdown in the event of an Appendix R Fire, Rev. 15

ED-Q0999-2003-0048, Appendix A, Table of Manual Operator Actions, Rev. 28

MDQ 1999-2003-0066, Appendix R-Fire Suppression Damage Evaluation, Unit 1, Rev. 002

MDQ 0026810018, Intake Pumping Station Pre-Action Fire Sprinkler System, Rev. 1

MDQ 0031-890069, Hydrogen Concentration - Control Bay 250 Volt Station Batteries, Rev. 1

MDQ0026-890024, Unit 2 Appendix R Fire Suppression Evaluation, Rev 0

MDQ3999-930023, Unit 3 Appendix R Fire Suppression Evaluation, Rev. 2

MDQ 0026910163, Combustible Load Table, Rev. 58

Drawings

0-46E454-22, Powerhouse Unit 0, Architectural Door & Hardware Schedule Appendix R, Rev. 5

0-47E865-4, Powerhouse Reactor Building Control Bay Unit 1 & 2, Flow Diagram Ventilation & Air Conditioning Air Flow, Rev. 067

0-45E724-3, Wiring Diagram 4160V Shutdown BD C Single Line, Rev. 39

0-45E765-11, Wiring Diagram 4160V Shutdown Auxiliary Power Schematic Diagrams, Rev. 46

0-D-3060K13-320, Elementary Diagram Pnl 9-29, Sheet 4 of 6, Rev. 10

0-47E865-16, Yard Unit 0, Flow Diagram Heating and Ventilating Air Flow, Rev. 6

0-47W216-51, Powerhouse Units 1-3, Fire Protection – 10CFR50 Appendix R Fire Area Compartmentation and Zone Drawings, Rev. 8

0-47W216-63, Powerhouse Unit 0, NFPA 805 Fire Areas and Physical Analysis Units, Rev. 0

1-47E610-26-1, Powerhouse and Yard, Unit 1 & 0, Mechanical Control Diagram High Pressure Fire Protection System, Rev. 34

1-45E714-2, Wiring Diagram 250V DC Reactor MOV BD 1A Schematic Diagram Sh-2, Rev. 10

1-47E811-1, Flow Diagram Residual Heat Removal System, Rev. 41

1-47E804-1, Flow Diagram Condensate, Rev. 61

1-47E859-1, Flow Diagram Emergency Equipment Cooling Water, Rev. 83

2-47E610-26-1, Powerhouse Unit 2, Mechanical Control Diagram-High Pressure Fire Protection System, Rev.20

2-45E714-2, Wiring Diagram 250V DC Reactor MOV BD 2A Schematic Diagram, Rev. 29

2-47E811-1, Flow Diagram Residual Heat Removal System, Rev. 75

3-47W216-62, Standby Diesel Gen. Bldg. Unit 3, Fire Protection-10CFR50 Appendix R Fire Area Compartmentation and Zone Drawings Plans & Sections, Rev. 0

3-46W401-20, Powerhouse-Diesel Generator Building Unit 3, Architectural Plans El. 565.5 & El. 583.5, Rev. 0

3-45E714-2, Wiring Diagram 250V DC Reactor MOV BD 3A Schematic Diagram, Rev. 19

3-45E724-8, Wiring Diagram 4160V Shutdown BD 3EC Single Line, Rev. 35

3-45E766-11, Wiring Diagram 4160V Shutdown Aux Power Schematic Diagram, Rev. 18

3-45E767-8, Wiring Diagram Diesel Generators Schematic Diagram, Rev. 13

3-46W401-20, Powerhouse Diesel Generator Building Unit 3 Architectural plans El. 565.5 and 583.5, Rev. 0

3-47E610-26-1, Powerhouse and Yard Unit 3 Mechanical Control Diagram-High Pressure Fire Protection System, Rev. 18

3-47W216-51, Powerhouse Units 1, 2, 3, Fire Protection-10CFR50 Appendix R Fire Area Compartmentation and Zone Drawing, Plans and Sections, Rev. 8
3-47W216-58, Powerhouse Units 1, 2, 3, Fire Protection-10CFR50 Appendix R Fire Area Compartmentation and Zone Drawing, Plans and Sections, Rev. 2
3-47W216-62, Standby Diesel Generator Building, Fire Protection-10CFR50 Appendix R Fire Area Compartmentation and Zone Drawing, Plans and Sections, Rev. 0
37W205-13, Water Supply Unit 1-3, Mechanical Pumping Station & water Treatment-Piping and Equipment, Rev. 0
47W216-63, NFPA 805 Fire Areas and Physical Analysis Units, Rev.0

License Basis Documents

Browns Ferry Bar Nuclear Plant Unit 1, Renewed Facility Operating License DPR 33
Browns Ferry Bar Nuclear Plant Unit 2, Renewed Facility Operating License DPR 52
Browns Ferry Bar Nuclear Plant Unit 3, Renewed Facility Operating License DPR 68
Fire Protection Report (FPR) Volume 1, Fire Protection Report, Rev. 17
Fire Protection Report (FPR) Volume 1, Section 2, Fire Hazard Analysis, Rev. 16
Fire Protection Report (FPR) Volume 1, Section 3, Safe Shutdown Analysis, Rev. 16
Fire Protection Report (FPR) Volume 1, Section 4, Appendix R Safe Shutdown Program, Rev. 17
Safety Evaluation Report, Browns Ferry Nuclear Plant Units 1, 2, 3 Appendix R Safe Shutdown Plan, dated December 8, 1988.
Safety Evaluation Report, Browns Ferry Nuclear Plant Units 1, 2, 3 Fire Protection Program, dated March 31, 1993.
Safety Evaluation Report, Browns Ferry Nuclear Plant Units 1, 2, 3 Post-Fire Safe Shutdown Capability and Issuance of Technical Specification Amendments, dated November 2, 1995
Safety Evaluation Report, Browns Ferry, Units 1, 2, and 3 RE: Completion of Licensing Action for Generic Letter 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors", dated March 21, 2000
Updated Final Safety Analysis Report (UFSAR), Chapter 10.11, Fire Protection Systems
Updated Final Safety Analysis Report (UFSAR), Chapter 10.18, Plant Communications
Updated Final Safety Analysis Report (UFSAR), Chapter 10.19, Lighting Systems
TVA Letter, TVA Supplemental Response – Mitigation Strategy Assessments and Closure Process for Phases 1, 2, and 3, dated 06/29/2007

Completed Surveillance Procedures, Test Records

111844375, Visual Inspection of Fire Rated Barriers (Unit 2 Steam Tunnel Floors, Walls & Ceilings), dated 3/22/2011
112074679, Visual Inspection of Second Period Appendix R Fire Dampers, dated 4/04/12
112074682, Visual Inspection of Third Period Appendix R Fire Dampers, dated 10/18/11
112075081, Visual Inspection of Fire Rated Barriers (Floors, Walls & Ceilings), dated 10/30/11
112199100, Visual Inspection of Fire Rated Barriers (Unit 3 Steam Tunnel Floors, Walls & Ceilings), dated 5/17/12
114414671, Visual Inspection of Fire Wraps, dated 12/14/11
112815598, Local Fire Control Panel 0-LPNL-925-0538 Intake Pumping Station and Cable Tunnel Detection Operability Test, dated 2/27/12
113158422, Visual Inspection of Cable Tray Penetrations in Fire Rated Barriers, dated 2/03/12

113164391, Visual Inspection of Cable Tray Penetrations in Fire Rated Barriers, dated 1/30/12
113211855, Visual Inspection of Fire Rated Barriers (Unit 1 Steam Tunnel Floors, Walls & Ceilings), dated 11/26/12
113862924, Visual Inspection of Fire Rated Barriers (Unit 2 Steam Tunnel Floors, Walls & Ceilings), dated 5/03/13
113486475, Local Fire Control Panel 0-LPNL-925-0556 Control Bay Elev. 617.0 Detection Operability Test, dated 7/24/12
113522861, Local Fire Control Panel 0-LPNL-925-0555 Control Bay Elev. 593.0 Detection Operability Test, dated 10/10/12
113800263, Diesel Driven Fire Pump (Gate Structure No. 2) Fuel Oil Quality Check, dated 1/28/13
113947857, Local Fire Control Panel 0-LPNL-925-0538 Intake Pumping Station and Cable Tunnel Detection Operability Test, dated 4/10/13
113950247, Local Fire Control Panel 3-LPNL-025-0543 U3 DG Building Detection Operability Test, dated 3/13/13
114003533, Diesel Driven Fire Pump (Gate Structure No. 2) Fuel Oil Quality Check, dated 5/02/13
114003549, Visual Inspection of Fire Rated Barriers (Floors, Walls & Ceilings), dated 5/04/13
114004596, Visual Inspection of Fire Rated Barriers (Floors, Walls & Ceilings), dated 10/09/12
114084766, Visual Inspection of Cable Tray Penetrations in Fire Rated Barriers, dated 6/20/13
114085246, Visual Inspection of Fire Wraps, dated 6/16/13
114251609, Diesel Driven Fire Pump (Gate Structure No. 2) Fuel Oil Quality Check, dated 7/26/13
114399742, Local Fire Control Panel 0-LPNL-925-0556 Control Bay Elev. 617.0 Detection Operability Test, dated 7/31/13
114426044, Weekly Inspect and Verify Proper Control of Transient Combustible and Hot Work Activities, dated 9/07/13
114558780, Weekly Inspect and Verify Proper Control of Transient Combustible and Hot Work Activities, dated 9/14/13
114558783, Weekly Inspect and Verify Proper Control of Transient Combustible and Hot Work Activities, dated 9/21/13
114558785, Weekly Inspect and Verify Proper Control of Transient Combustible and Hot Work Activities, dated 9/28/13
114558787, Weekly Inspect and Verify Proper Control of Transient Combustible and Hot Work Activities, dated 10/05/13
114558789, Weekly Inspect and Verify Proper Control of Transient Combustible and Hot Work Activities, dated 10/13/13
114558791, Weekly Inspect and Verify Proper Control of Transient Combustible and Hot Work Activities, dated 10/21/13
114558793, Weekly Inspect and Verify Proper Control of Transient Combustible and Hot Work Activities, dated 10/27/13
114595024, Local Fire Control Panel 0-LPNL-925-0555 Control Bay Elev. 593.0 Detection Operability Test, dated 10/15/13
114609242, Diesel Driven Fire Pump (Gate Structure No. 2) Fuel Oil Quality Check, dated 10/21/13
114613123, Local Fire Control Panel 0-LPNL-925-0555 Control Bay Elev. 593.0 Detection Operability Test, dated 2/19/13
114724632, Local Fire Control Panel 3-LPNL-025-0543 U3 DG Building Detection Operability Test, dated 9/12/13
FP-0-026-INS034, Portable Fire Pump Functional Test, dated 10/25/2013

Fire Fighting Preplan Strategies

FPR-Volume 2 Appendix "O", Reactor Building Unit 1, Rev. 51
FPR-Volume 2 Appendix "T", Control Building Unit 3, Rev. 51
FPR-Volume 2 Appendix "V", Diesel Generator Building Unit 3, Rev. 51
FPR-Volume 2 Appendix "W", Intake Structure, Rev. 51

Operator Work Arouds

LCOTR: 1-069-OWA-2013-0049
LCOTR: 2-001-OWA-2013-0046
LCOTR: 2-084-OWA-2012-0025
LCOTR: 3-023-OWA-2012-0172
LCOTR: 3-084-OWA-2012-0026

Applicable Codes & Standards

NFPA 10, Fire Extinguishers, 1967
NFPA 13, Automatic Sprinkler Systems, 1985, 1987, 1991 and 2002
NFPA 14, Standpipe and Hose Systems, 1986
NFPA 20, Centrifugal Fire Pumps, 1987
NFPA 24, Outside Protection, 1984
NFPA 72, Proprietary Protective Signaling Systems, 1990
NFPA 72, Automatic Fire Detectors, 2002
NFPA 80, Fire Doors and Windows, 1986
NFPA 90A, Installation of Air Conditioning and Ventilation Systems, 1989

Technical Manuals, Vendor Information and Fire Tests

BFN-VTD-C742-0010, Cummins Diesel Engine Operations and Maintenance Manual, Rev.002

Audits & Self-Assessments

System Health Report, System 026, High Pressure Fire Protection and Fire Detection 9/01/12 to 1/31/13, 2/01/13 to 5/31/13 and 6/1/13 to 9/30/13
System Health Report, System 039, CO2 Storage, Fire Protection and Purging 7/01/12 to 1/31/13 and 2/01/13 to 5/31/13
Appendix R System Health Report, 7/01/2012 to 12/31/2012 and 1/01/2013 to 6/30/2013
TVA Quality Assurance-Nuclear Power Group (NPG) Browns Ferry Nuclear Plant (BFN) Fire Protection Audit Report SSA 1214
TVA Quality Assurance-Nuclear Power Group (NPG) Browns Ferry Nuclear Plant (BFN) Fire Protection Audit Report SSA 1012

Other Documents

Browns Ferry Biennial Training Plan Template, LOR Cycle 1203
Browns Ferry Biennial Training Plan Template, LOR Cycle 1302
Browns Ferry Biennial Training Plan Template, LOR Cycle 1304
Browns Ferry Biennial Training Plan Template, LOR Cycle 1201
BFN Operation Fire Protection Section Instruction Letter FPSIL-15
BFN Operation Standing Order OS-0192
Fire Protection Section Instruction Letter, Transient Combustible Loading Control, FPLIS-015, Rev.1
Fire Protection Impairment Permit (FPIP) #13-4046, dated 6/06/13
Fire Drill Evaluation Report, dated 10/22/12
Fire Drill Evaluation Report, dated 3/13/12
Fire Drill Evaluation Report, dated 6/13/12
Current Medical Approval Records / Request for Medical Evaluation for Brigade (24 total)
Fire Protection Impairment Log, 9/12/13
Fire Protection Impairment Log, 10/28/13
Huntsville International Airport Mutual Aid Agreement, April 5, 2013
Athens Fire Rescue Mutual Aid Agreement, April 2, 2013
Decatur Fire Rescue Mutual Aid Agreement, April 2, 2013
OPL171.031, Safe Shutdown Instruction, Revision 13
OPL171.036, AC Power Distribution, Revision 12
OPL171.037, DC Systems, Revision 12
OPL171.040, Reactor Core Isolation Cooling (RCIC), Revision 23
OPL171.042, High Pressure Coolant Injection (HPCI), Revision 20
OPL171.043, Automatic Depressurization System (ADS), Revision 13
OPL171.044, Residual Heat Removal (RHR), Revision 17
OPL171.046, Residual Heat Removal Service Water (RHRSW), Revision 15
OPL.171.051, Emergency Equipment Cooling Water (EECW) System, Revision 16
OPL171.081, Appendix R, Revision 11
Seismic Qualification Utility Group (SQUG), Section 2, Seismic Evaluation Personnel, Rev 3A
Seismic Qualification Utility Group (SQUG), Section 3, Identification of Safe Shutdown Equipment, Rev 3A
Seismic Qualification Utility Group (SQUG), Appendix A, Procedure for Identification of Safe Shutdown Equipment, Rev 3A
Seismic Qualification Utility Group (SQUG), Appendix D, Seismic Interaction, Rev 3A
Transient Combustible Evaluation 07.18.13.01, dated 7/18/13
Transient Combustible Evaluation 09.26.13.02, dated 9/26/13
Verification and Validation Appendix R Manual Actions: 0-SSI-5, 0-SSI-16, 0-SSI-22, and 0-SSI-25-1

Work Orders Reviewed

WO114393411, BFN Fire Wrap Showing Water Damage at Intake
WO114759479, BFN-3-Door-260-0812 Broken Latch
WO 111875046, Perform Hydrostatic Test of the Fuel Pool Makeup Hoses
WO115236900, Needle on PI on HPFP System Pegging

WO115249417, Fire Operations Channel Pump
WO114317762, 0-SR-3.3.3.2(67) – Backup Control Panel Testing
WO114399018, Attachment A to Task 10, BFN-1-LGT-247, RB00067
WO113978592, 18-Month Battery Operated Emergency Light Test (Appendix R)
WO114403381, BFN-1-LGT-247-CB00017, Repair Appendix R Light

LIST OF CAP (PERs) REVIEWED DURING INSPECTION

PER No.	Description
109961	App R spurious valve opening
681298	Light FN-1-LGT-247-RB00067 failed to illuminate
682567	Appendix R light unit CB00017 was not illuminated after 8 hours
786244	1-AOI-30.2 C Series Procedure Times

LIST OF CAP (PERs) GENERATED AS A RESULT OF THIS INSPECTION

PER No.	Description
788930	Fire extinguisher Supports in Unit 3, 3EB & 3ED
788893	Fire detector placement in Control Building, 3C Hallway
790063	Fire Seal 526215451 has a cracked concrete support
788894, 790135	Kitchen/Lunchroom door found blocked open
790065	Junction box in fire exclusion area is not properly sealed
790070	Florescent lighting ballast is attached to ceiling with heavy gauge wire
790254	Transient combustible surveys lack rigor
800096	Fire Protection Report not reviewed for impacts
801823	Calculation EDQ099920030037 documentation update
801830	Calculation EDQ099920030037 App. H documentation update
801268	Needle on PI pegged out max and needle is bent
800827	Lighting needing repaired or replaced
801946	Evaluation needed for lighting
801057	Incorrect Change Process used for Shift Staffing Change
802030	Drawing Discrepancy 3-47W3392-215
802015	Lighting needing repaired or replaced
802018, 803542	Extension Cord in IPS
802537	Modification of ventilation in Unit 3 kitchen area.
802536	NRC questions concerning fire door evaluation
802572	App R calculation issue
802587	3-SI-4.11.A.1(1) needs to be revised
802613	Transient Materials located on 3C Hallway, Control Bay
803544	Cable to be reworked and placed back in tray KKU - U3 DGB
802594	Fire Protection Report Vol. 1 Part 4 Discrepancy
803558	Low temperature requirement for Channel Diesel Fire Pump Room
803727	Revise procedures 3-SI-4.11.A.1(1) and 0-SI-4.11.A.2(1)
803739	Trace wires at tray CD in intake pumping station

803742 Trace wires at tray RF-ESII in intake pumping station
803658 Drawing Discrepancy on 0-45E765-5, R52
804264 DCN 51211 Calculation Checklist Discrepancy
804806 Fire Protection Instruction
804857 SSI Illustrations comparison to FPR, Vol. 1, Part 3 discrepancies
804882 RSW Head Tank Isolation to prevent fire system flow diversion
804883 Pre-Fire Plan DG3583 does not identify access door of diesel auxiliary board room

804968 Calculation ED-Q0211-880138 typo
804995 Enhancement to EDMG-24 Appendix E
804965 Evaluation of shelf life for aqueous film-forming foam (AFFF)
804967 No Emergency lights in Fire Operations Fire Cage
804977 No Emergency lights at Warehouse 5
805603 Evaluate the risk associated with the Operator kitchen located in Fire Area 16

805703 Potential Vulnerability with the DDFP Compensatory Actions
805714 Issues identified in Warehouse 5 Walk down
806209 Calculation Does Not Adequately Address All Potential Flow Losses
806225 NRC identified issue on inspection of internal conduit fire seals
807415 Review 2013 Fire Protection Inspection PERs for NFPA 805 Impact
807430 NRC identified issues with Appendix "R" lighting procedures
809997 Failure to properly document a change to the FPR
812087 Failure to provide the required flow for the Spent Fuel Pool Internal Makeup

812090 Inadequate compensatory actions to minimize the effects of impaired fire protection equipment on fire safe shutdown
812091 Inadequate evaluation of combustible material control fire protection program change
819490 WO as compensatory measure to meet EDMG-23 App C.

LIST OF ACRONYMS AND ABBREVIATIONS

ADAMS	-	Agencywide Document Access and Management System
BFN	-	Browns Ferry Nuclear Plant
CAP	-	corrective action program
CFR	-	Code of Federal Regulations
DCN	-	design change notice
EECW	-	emergency equipment cooling water
EDG	-	emergency diesel generator
ELU	-	emergency lighting unit
FA	-	Fire Area
FHA	-	fire hazards analysis
FPP	-	Fire Protection Program
FPR	-	Fire Protection Report
FSAR	-	Final Safety Analysis Report
HPFP	-	high pressure fire protection
IMC	-	Inspection Manual Chapter
IR	-	Inspection Report
MCR	-	Main Control Room
NCV	-	non-cited violation
NFPA	-	National Fire Protection Association
NRC	-	U.S. Nuclear Regulatory Commission
OMA	-	operator manual actions
PER	-	problem evaluation report
RCW	-	Raw Cooling Water
RHR	-	residual heat removal
RHRSW	-	residual heat removal service water
SDP	-	significance determination process
SER	-	safety evaluation report
SFP	-	spent fuel pool
SSD	-	Safe shutdown
SSI	-	Safe Shutdown Instruction
TS	-	Technical Specification(s)
TVA	-	Tennessee Valley Authority
UFSAR	-	Updated Final Safety Analysis Report
WO	-	work order